

Modular Advanced Networked Telerobotic Interface System (MANTIS), Phase II

Completed Technology Project (2017 - 2020)

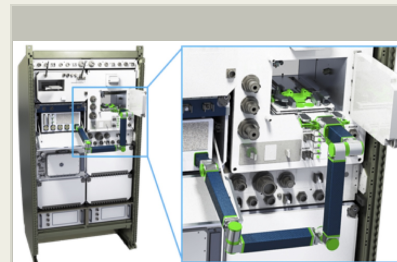


Project Introduction

With the goal to reduce astronaut time required to operate experiments on the ISS and advance automated and telerobotic technology, TUI proposes to collaborate with NanoRacks to develop a "Modular Advanced Networked Telerobotic Interface System" (MANTIS) that will integrate TUI's existing KRAKEN robotic arm in a payload on the ISS. The MANTIS payload will reduce crew member burden to operate experiments by enabling automated and/or supervised teleoperation of the Plate Reader, MixStix, and other systems. MANTIS will also give researchers an open software framework based on the Robot Operating System (ROS) environment. MANTIS can also be used in STEM outreach through NASA sponsored competitions. The Phase I effort developed a detailed design for MANTIS payload. The Phase II effort will build an engineering unit of the MANTIS payload, design a unit ready for flight-qualification, and build an integrated test environment to enable NASA and NanoRacks to develop and test procedures for using the MANTIS payload. The Phase III effort will mature the MANTIS payload to TRL-6 by performing experiments on NanoRacks hardware aboard the ISS. NanoRacks will collaborate with us in these efforts to enable integration with their experiment platform, and will be our transition partner for Phase III commercialization.

Anticipated Benefits

The MANTIS effort will deliver to NASA the development and integration tools and open software to enable researchers to develop and validate plans for using the MANTIS system to conduct experiments on the ISS using the MANTIS hardware planned for integration into the NanoRacks NanoLab facility. These tools will enable NASA and other entities to develop, validate, and then test on-orbit new methods for teleoperation and autonomy in the microgravity environment. TUI intends to transition the MANTIS technology to our commercialization partner NanoRacks, who will use the MANTIS system to dramatically increase experimental throughput on their NanoLabs systems on the ISS. In addition, the MANTIS platform will give researchers in NASA, academia, and commercial companies the ability to perform experiments with supervised telerobotic operation on the ISS as well as provide the community with development and integration tools, open software, and accessible hardware. The strong potential for successful commercial transition is evidenced by NanoRacks in-kind contributions to the MANTIS effort.



Modular Advanced Networked Telerobotic Interface System (MANTIS), Phase II Briefing Chart Image

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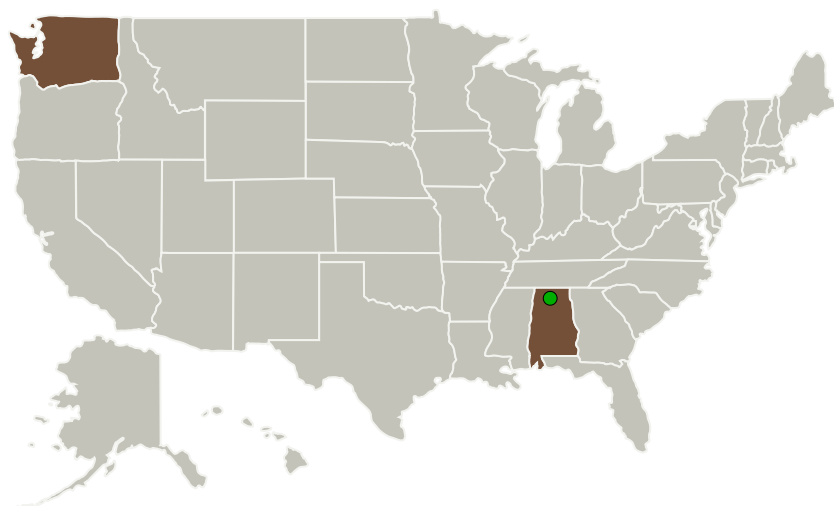
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Tethers Unlimited Inc	Lead Organization	Industry	
● Marshall Space Flight Center (MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	Washington

Project Transitions

▶ **April 2017:** Project Start

✓ **September 2020:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140996>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Tethers Unlimited Inc

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Managers:

Tracie J Prater
Gwenevere L Jasper

Principal Investigator:

Gregory Jimmerson

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✓ **September 2020:** Closed out

Closeout Documentation:

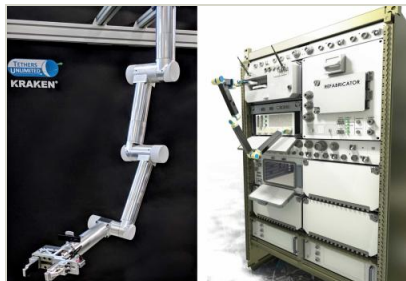
- Final Summary Chart PDF(<https://techport.nasa.gov/file/140995>)

Images



Briefing Chart Image

Modular Advanced Networked Telerobotic Interface System (MANTIS), Phase II Briefing Chart Image
(<https://techport.nasa.gov/image/137226>)

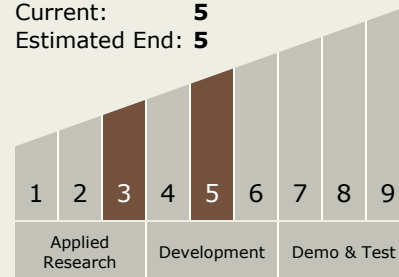


Final Summary Chart Image

Modular Advanced Networked Telerobotic Interface System (MANTIS), Phase II
(<https://techport.nasa.gov/image/128013>)

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System